

**WHAT IS CLAIMED IS:**

1. A method for removing nitrates from water containing nitrates as pollutants, comprising a stage in which the water is made to flow over an inert porous carrier which supports a transition metal capable of activating  
5 molecular hydrogen, forming metallic hydrides, and on which denitrifying bacteria adhere which can survive in anoxic conditions and in the presence of hydrogen, and wherein hydrogen is used as a reducing agent and is made to react in the stoichiometric quantity required by the denitrification reaction or in a larger quantity, and the pH of the reaction is adjusted to values from  
10 4.5 to 7.8 with carbon dioxide or with acids which provide anions that are commonly present in potable water.

2. The method according to claim 1, wherein the bacteria are selected from the group consisting of *Pseudomonas fluorescens*, *Xanthomonas maltophila*, *Flavobacterium indologenes*, *Alcaligenes eutrophus*,  
15 *Pseudomonas maltophila* and *Pseudomonas putrefaciens*.

3. The method according to claim 1, wherein the transition metal is palladium, used in quantities of 0.05 to 0.5% by weight on the carrier.

4. The method according to claim 1, wherein the carrier is constituted by vegetable activated carbon which has a surface area of 600 to 1100 m<sup>2</sup>/g and  
20 a porosity of 0.6 to 0.8 cm<sup>3</sup>/g.

5. The method according to claim 1, wherein the carrier is selected from the group consisting of porous inorganic oxides and polymeric materials having a surface area of more than 30 m<sup>2</sup>/g.

6. The method according to claim 1, wherein the hydrogen is used in a  
25 quantity higher than the stoichiometric quantity.

7. The method according to claim 1, wherein the pH is adjusted by using carbon dioxide.

8. The method according to claim 7, wherein the denitrification reaction is conducted under a pressure of carbon dioxide.

30 9. The method according to claim 1, wherein the denitrified water from

which the unreacted hydrogen, nitrogen and carbon dioxide are degassed beforehand by flashing is treated with ozone in order to eliminate the presence of nitrites.

10 5 10. The method according to claim 1, wherein the water to be denitrified is made to flow from the bottom of a denitrification reactor through the catalytic mass with an ascending flow in equicurrent with the flow of hydrogen and carbon dioxide.

11. The method according to claim 1, applied to the denitrification of water for potable use.

10 12. The method according to claim 1, applied to the denitrification of industrial water for beverages or food or wastewater containing nitrates.

15 13. A carrier for denitrification of water, comprising a transition metal capable of activating molecular hydrogen with formation of metallic hydrides and on which denitrifying bacterial strains adhere which are capable of surviving in anoxic conditions and in the presence of hydrogen.

14. The carrier according to claim 13, wherein the metal is palladium and the carrier is activated carbon.

20 15. The carrier according to claim 13, wherein the bacteria are selected from the group consisting of *Pseudomonas fluorescens*, *Xanthomonas maltophila*, *Flavobacterium indologenes*, *Alcaligenes eutrophus*, *Pseudomonas maltophila* and *Pseudomonas putrefaciens*.

25 16. An apparatus for denitrification of water, comprising a denitrification reactor, containers of hydrogen and carbon dioxide which are directly connected to the denitrification reactor, a tank for flashing the gases dissolved in the water that arrives from the denitrification reactor, an ozonization unit for feeding ozone into the water that arrives from the flashing tank.

30 17. The apparatus according to claim 16, wherein the hydrogen and the carbon dioxide that arrive from the flashing of the water are recycled to the reactor.